



EL PASO LANDSCAPE PERSPECTIVE

Researchers study water conservation, plant-tolerance, and water reuse



Dr. Genhua Niu of El Paso is identifying drought, salt, and heat-tolerant landscape plants more suitable for El Paso's environment in her research.

The hot, dry climate and saltier water of El Paso can be a landscaper's nightmare. But scientists at the Texas AgriLife Research and Extension Center at El Paso are researching plant and turf tolerance to better adapt to this climate and saline water situation. In addition, reclaimed wastewater is being used on larger public areas as a way to reuse water resources and conserve potable, or drinkable, freshwater supplies.

Dr. Ari Michelsen, El Paso center director, recognizes the importance of water as well as managing limited water resources in El Paso's desert environment.

"Water is essential and one of the most important resources for human health, economic growth, quality of life, and environment, especially in the desert conditions of El Paso, the fifth-largest city in Texas and the 19th-largest in the United States," Michelsen said. ➡



“Landscape irrigation typically accounts for half of annual residential water use,” he said. “Finding and developing low water use, drought- and salt-tolerant plants are critical to conserving and protecting our limited freshwater supplies to ensure the sustainability of the region.”

Home landscape water conservation

Dr. Genhua Niu, associate professor at the El Paso center, focuses her research on identifying drought-, salt-, and heat-tolerant plants that are better suited for this environment.

“There is more information available on trees and shrubs, but very limited information on herbaceous plants—annual and perennial landscape plants,” Niu said. “So I started drought-tolerant studies on herbaceous perennials including wildflowers and ground cover. Those are relatively low-maintenance and colorful landscape plants, which can save water, add to landscape appearance, and reduce costs.”

Some of the plants Niu is researching are yarrow (*Achillea millefolium*), blanket flowers, lantana, honeysuckle (*Lonicera haliana*), rosemary (*Rosmarinus officinalis*), and verbena.

“I also started to include bedding plants (annuals) in our research,” she said. “We found that some bedding plants performed very well in El Paso landscapes; that is, they can handle the heat and drought. For example, angelonia, petunia, vinca, ornamental peppers, and blue plumbago are moderately tolerant to salt stress. They can be safely irrigated with municipal reclaimed water without any foliar damage, although plants would become a little compact.”

Niu is also starting to investigate garden roses, including EarthKind® and other potentially stress-tolerant rose cultivars. EarthKind® roses have not been tested in El Paso, although these varieties have been tested in most other areas in Texas.

To put the situation more into perspective, El Paso’s average rainfall is only 8 inches per year, and the area has had no significant rain since summer 2010. Therefore, not only is a very dry climate the norm, but El Paso also experienced “the driest winter we have ever had,” she said. Niu’s research is irrigating plants with varying saline

solutions and/or levels of drought to determine how the plants respond. She is also conducting research testing salt tolerance on different types and varieties of chile peppers. This research will help growers select appropriate varieties for their field and water conditions, help breeders develop improved varieties, and will result in increased yields and farm revenue.

“It’s a unique situation here because we do not have much natural rain, and we also have very limited water resources,” Niu said. “The surface water is from the Rio Grande, which is from snow melt from Colorado and is highly variable, and we have two aquifers with limited and, in many areas, poorer quality (saline) water.”

In the end, Niu said, “Everything is related to drought and salt.”

In addition to the ongoing water conservation research, in 1991 El Paso Water Utilities (EPWU) enacted the Water Conservation Ordinance that applies to anyone who uses water from the EPWU supply system. The ordinance provides mandatory year-round restrictions on certain water usages and prohibits water waste, according to the EPWU website, which makes research such as Niu’s even more applicable.

Anai Padilla, EPWU water conservation manager, said, “The ordinance is included on our overall strategic plan that includes among other things: optimization of water resources (surface water and groundwater), water conservation (supply and demand side), reclaimed water, and desalination. It has been one of the key factors in bringing our aquifer back to a sustainable level and making sure there is an ample water supply for the next 50 years before considering the importation of water.”

The ordinance includes tips for El Paso residents, such as watering landscapes based on an even and odd house number schedule and a three-day week, Padilla said.

“Many educational campaigns have been in place throughout the years, not only to introduce the ordinance, but also to provide customers with ‘how to’ tips to conserve water,” Padilla said. “In addition, El Paso Water Utilities has been successful



in establishing rebates and incentive programs to further augment conservation efforts.”

According to Padilla, the per capita water use in the 1990s was close to 200 gallons per person per day. The current per capita water use is 133 gallons per person per day.

To adjust to the climatic conditions and adhere to the city ordinance, Niu encourages homeowners to look for plants that can tolerate El Paso’s harsh environment, and particularly those that can tolerate drought, heat, and salt as well as, in the case of this past winter, cold. Plants that fit into these areas will also work into EPWU’s water conservation ordinance requirements.

Irrigating large green areas with reclaimed water

Another scientist who has been involved in ongoing studies on turfgrass irrigation with reclaimed water is Dr. Seiichi Miyamoto, professor at the El Paso center. Through his and others’ efforts, both advantages and disadvantages of reclaimed water use are brought to the table for comparison.

“Reclaimed water in El Paso and elsewhere in the Southwest provides a comparatively small portion, typically no more than 5 percent to 10 percent, of the total urban water supply,” Miyamoto said. “It is not a cheap water conservation option either.”

Nonetheless, using reclaimed water instead of conventional potable water for irrigation provides direct savings of potable water, and in turn conserves water, he said.

“From the view of water users, especially those who have large areas of turf, it provides a stable water supply at a discounted price,” Miyamoto said. “The stable supply becomes a huge advantage during drought when outdoor water use has to be curtailed.”

In spite of these advantages to both water providers and large water users such as parks, schools, and athletic fields, he said irrigation with reclaimed water caused some initial confusion. “The most widespread problem was plant-leaf damage in broad leaf trees and ground cover caused by overhead sprinkling.

“Plant leaves absorb salts when sprinkled. We developed a list of plants that are sensitive to this form of damage. We also found that this form of salt injury is relatively easy to correct through conversion to under-canopy sprinklers, drip, or bubbler irrigation systems.”

The second type of damage, which Miyamoto said is much more limited, is plant growth reduction as a result of salt accumulation in soils. “This problem occurs mainly in sports turfs located on certain soil types. We are currently investigating the soil types that are prone to salinization, and cost-effective ways to reduce this form of salt problems.”

When the public looks at and compares landscapes irrigated with reclaimed water versus potable water, he said usually no one can tell the difference until they are told which is which. However, landscapes developed in poorly permeable soils or landscapes with broadleaf trees and ground cover irrigated with overhead sprinklers are an exception.

“There are greater differences in landscape quality among those irrigated with either potable or reclaimed water,” Miyamoto said. “This usually means that soil and landscape types, plant and irrigation system selection, soil preparation, and management practices play a dominant role in controlling quality of landscapes.”

The bottom line, Miyamoto said, is irrigation with reclaimed water works when water users want to make it work.

Niu, Miyamoto, and other scientists from the El Paso center have published many articles, papers, and fact sheets on their research and results thus far as well as lists of native, tolerant plants, trees, and shrubs. Some of this research is supported by the Rio Grande Basin Initiative, administered through Texas Water Resources Institute and funded by the U.S. Department of Agriculture’s National Institute of Food and Agriculture. Publications, fact sheets, and other information can be found at twri.tamu.edu/txH2O or elpaso.tamu.edu/research/landscape.php. For information on EPWU ordinances and programs, visit www.epwu.org/. 

